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SOUTH PLUME ACTIVITIES REPORT

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REPORT

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BACKGROUND INFORMATION

Through Consent Agreement negotiations between U.S. DOE and U.S. EPA it was determined that a removal action is necessary to address an area of uranium contaminated ground water which is located off-site and south of the FMPC. An Engineering Evaluation/Cost Analysis (EE/CA) document was prepared to evaluate alternatives for the removal action, select a preferred alternative and to document the decision. The EE/CA document was submitted to U.S. EPA, Ohio EPA and issued for public comment on April 14, 1990.

RI/FS analytical data available as of September 15, 1989 were utilized for the evaluation of the south plume removal action. This data indicated the presence of radionuclides and inorganic metals in the groundwater south of the FMPC. Most of the radionuclides are found at natural background concentrations. None of the radionuclides or metals exceed established or derived drinking water limits with the exception of uranium. Certain organic chemicals have also been observed in some samples, but these observations have not been persistent for the same monitoring wells and are far below allowable maximum concentration levels for all organics detected. For this reason, uranium has been designated as the contaminant of concern for the south plume removal action. All considered actions that account for public health and environmental protection against uranium will also provide protection against other radionuclides and chemicals due to the low levels present.

The extent and distribution of uranium in the south plume have been established by combining ground water monitoring data with the results of a ground water flow/solute transport model. The monitoring data were utilized to establish the following: (1) a lower limit on the maximum concentration in the south plume [i.e., the maximum observed off-site RI/FS value of 292 micrograms per liter (ug/l)]; (2) a conservative estimate of the shape and extent of the plume (as defined by those wells closest to the plume that exhibit background levels of uranium); (3) direct evidence of the uranium levels at actual receptor locations; and (4) the general shape of the uranium plume for use in calibrating the model.

The model was then used to interpolate between and extrapolate beyond the points of field observation. By doing so, the full distribution pattern of uranium in the south plume both today and under assumed future conditions could be estimated. The plume is predicted by the model to be an elongated ellipse oriented in a northwest/southeast direction due to the ground water flow patterns through a narrow, north/south trending buried channel. The center of the plume is predicted to lie approximately 800 feet south of Willey Road and north of the developed areas along Paddy's Run and New Haven Road.

Based on this representation of the plume, approximately 100 acres of off-site property is underlain by ground water with uranium concentrations exceeding the Derived Concentration Guide which is applicable for uranium in drinking water and is equivalent to 33 ug/l. This value is calculated from the 50-year committed effective dose equivalent (CEDE) limit of 4 millirems (mrem) from an annual intake of radioactive materials in drinking water. The DOE has specified that this CEDE limit shall apply to releases to all off-site areas where water could be used as a drinking water source (DOE 5400.5).

There is no known use of ground water with uranium levels exceeding the proposed derived concentration limit of 33 ug/l from the south plume areas for drinking water, feedstock watering, or crop irrigation. The only known users of ground water with uranium levels exceeding the proposed derived concentration for uranium in drinking water are the two industries located along Paddy's Run Road southwest of the projected center of the plume.

One drinking water well located on the west side of Paddy's Run has shown levels of uranium above background. This privately owned well was found to contain approximately 5 parts of uranium per billion parts of water. The level of uranium has shown an increasing trend since February 1990. The uranium source at this well is believed to be attributed to recharge from Paddy's Run Creek, which is located north of the well and not from the south plume. Because of heavy rainfall, water flow in Paddy's Run had increased and probably resulted in migration of uranium along flow paths which do not represent normal ground water movements.

As a result of the presence of this contamination, a program of increased monitoring at well locations in this area will be initiated. Data from this program will guide decisions concerning any additional remedial investigation or action. Negotiations are also underway with the property owner concerning an alternate drinking water supply.

Potential future receptors of uranium in ground water south of the FMPC include: (1) persons who pump ground water for potable use, crop irrigation, or livestock feeding from areas not currently impacted but located along the future migration pathway of the plume, and (2) persons who would use surface waters into which contaminated groundwater has been discharged.

REMOVAL ACTION SCOPE

The scope of the proposed removal action can be broadly defined as management of radioactively contaminated groundwater in an off-site area south of the FMPC. The fundamental objective of the removal action for the south plume is to protect public health by limiting access to and use of ground water with uranium concentrations exceeding the derived concentration limit of 33 ug/l for uranium in drinking water, as well as other appropriate, risk-based levels from various potential exposure scenarios. For

purposes of this removal action, this objective represents a minimum requirement that would have to be achieved by any removal action. Additionally, secondary objectives have been formulated for the south plume removal action which include the following:

- o Protection of the ground water environment, which in this case is represented by a sensitive, sole source aquifer
- o Mitigation of the source of ground water contamination, which in this case is represented by the prevention of future releases across the FMPC site boundary
- o Control of plume migration toward additional receptors further south

REMOVAL ACTION ALTERNATIVES EVALUATION

Based on these identified objectives and on the preliminary results of the development and screening of specific remedial action alternatives in the RI/FS for the contaminated ground water, the following alternatives were selected for evaluation in the South Plume EE/CA:

- 1) No Action
- 2) Ground Water Monitoring and Institutional Controls
- 3) Alternate Water Supply with Ground Water Monitoring and Institutional Controls (referred to hereafter as Alternate Water Supply)
- 4) Groundwater Pumping without Treatment, Alternate Water Supply, Ground Water Monitoring, and Institutional Controls (referred to hereafter as Pump and Discharge)
- 5) Ground Water Pumping with Treatment, Alternate Water Supply, Ground Water Monitoring and Institutional Controls (referred to hereafter as Pump and Treat)

Each of these alternatives were evaluated according to the following criteria:

- o Effectiveness
- o Implementability
- o Cost

Based on the comparison of alternatives, Alternative 4, which includes ground water pumping with direct discharge to the Great Miami River, an alternate water supply to two currently affected industrial users and enhanced monitoring and institutional controls, was selected as the alternative that most comprehensively satisfies the evaluation criteria.

As documented in the EE/CA, the current data base and the results of the ground water and solute transport models are considered sufficient and adequately reliable to support the selection of Alternative 4.

REMOVAL ACTION SCHEDULE

A phased approach is proposed for the south plume removal action to effectively resolve key technical issues. Upon approval of this EE/CA and the recommended alternative, design efforts will commence on the alternate water supply component of the removal action. Implementation of the alternate water supply, as well as the monitoring and institutional control components, will follow once the design is accepted. The second phase of activities will involve the pump and discharge component of Alternative 4. The final selection of the number, location, and pumping rates of the wells will be part of this second design phase. It is estimated that the alternate water supply will be on line approximately six months prior to the pump and discharge system.

All regulatory and public review cycles and timeframes will be consistent with the National Contingency Plan (NCP) and the draft Consent Agreement between U.S. DOE and U.S. EPA Region V.